

REMARKS AND ARGUMENTS

These remarks are made in response to the Office Action of June 23, 2009. A petition for three month extension of time (with fee) is filed concurrently. The Commissioner is hereby authorized to charge any deficiency or credit any surplus to Deposit Account No. 14-1437.

Applicants wish to thank the Examiner for the thorough search and thorough consideration of the present application.

Claims 19 – are pending and Claim 19 is the sole independent claim.

Response to Objections

The specification (paragraph [0031]) and claims (the use of CH₂ rather than CH2 and replacement of “characterized in that” with “wherein”) have been changed as kindly suggested by the Examiner.

Response to Rejections Under 35 U.S.C. § 112

Claims 19, 31, and 38-40 have been clarified to respond to the rejection. With respect to Claim 19 and the question of the molecular weight range, Applicants submit that the lower end of the range is 0.05 billion not 0.05, as seen by the progression of the narrowing of the range in the dependent claims. In this regard, the dependent claims have also been amended to clarify that the lower end of the range is “billion” although this is done more for consistency of approach since, as dependent claims, the lower end of a range would be presumed not to be lower than the lower end of the range in the independent claim from which they depend.

Response to Rejections Based Upon Prior Art

First Rejection – Paragraph 8 of the Office Action

The rejection of claims 19-23, 25-31, and 33-41 under 35 U.S.C. § 103(a) as being unpatentable over Duerr (US Patent 5,512,618) in view of Spencer et al. (US 2002/0033116) is respectfully traversed.

In order to consider the propriety of the rejection, including the “obvious to use ... with expected success” statement in the Office Action, consideration of the nature of the invention, the nature of the problem solved by Applicants, and the nature of the prior art should be analyzed.

According to the prior art, in the manufacture of corrugated board, Applicants identified certain problems. Specifically:

- (i) good adhesion of the corrugations to the flat liner is needed, which means that the presence is required of a sufficient amount of adhesive on top of the corrugations;
- (ii) simultaneously the amount of adhesive should not be too large, to
 - a. minimize energy consumption for evaporating the water contained in the adhesive, and
 - b. minimize the risk to deformation of the corrugations. (The risk of penetration of the adhesive into the material of the corrugations is to be minimized as this weakens the corrugations); and
- (iii) it is important that adhesive is applied to the top of the corrugations, and that the flowing of the adhesive into the valleys between the corrugations is minimized, to minimize loss of adhesive.

Applicants discovered that these problems may be solved by:

1. Reducing the viscosity of the adhesive when the adhesive is applied to the corrugated board. (As a result, the amount of adhesive applied can be reduced (one of the problems to be avoided, see (ii) above)). This is an advantage as it avoids unnecessary use of adhesive, and will reduce energy consumption for evaporating the water from the cardboard after the adhesive has been applied.
2. Restoring the viscosity of the adhesive immediately after the adhesive composition has been applied, to minimize the risk to flowing of the adhesive as described above into the valleys of the corrugations (as described above in part (iii)); and
3. Recognizing that the adhesive compositions that are used in the manufacturing of corrugated board usually have a high solids content, which may amount to 20 wt. %

or more (see, e.g., page 8 of the PCT application as filed, lines 14-19), therefore, those adhesive compositions will have a rather high viscosity, and further increasing of the viscosity is usually not at stake.

Applicants' specific solution to the problems, as set forth in the independent claim, is the use of an additive for the adhesive in which:

A. Upon application of the adhesive, viscosity of the adhesive composition is reduced because of the shear forces exerted on the composition. As a result of reduced viscosity, a smaller amount and a thinner layer of adhesive composition can be applied to the corrugations. The result is that the amount of water contacting and penetrating the paper/card board is reduced, thus reducing energy requirements for evaporating water from the corrugated paper board and minimizing the risk to deformation of the corrugated paper/card as well as of the flat liners.

B. As soon as the adhesive composition has been applied to the corrugations, the shear forces disappear and viscosity of the adhesive composition is immediately restored. As a result, the risk to flowing of the adhesive composition (from the corrugations into the valleys) is reduced to a minimum, and thus the extent to which the adhesive composition penetrates the corrugated board is reduced as well, and good adhesion of the corrugations to the flat liners is achieved.

C. Viscosity may be reversibly increased and decreased several times, depending on the absence or presence of shear forces. This is important as in the production of corrugated board, the adhesive composition is subjected to stress at several points of time:

- i. A first time when pumping the adhesive from the reservoir to the application roll;
- ii. A second time when transferring the adhesive from the application roll to the doctor roll;
- iii. A third time when transferring the adhesive from the doctor roll to the paper; and
- iv. A fourth time when the flat liner is pressed onto the corrugated liner.

The Spencer et al document discloses erasable inks which show good writing performance and which allow markings formed with the ink to be erased. The ink composition comprises:

- (a) a solvent;
- (b) a pigment with a flake-like morphology. The morphology of the pigment (i.e. dimensions, length-width ratio) is selected to provide good erasability and writing properties. The *largest dimension* of the pigment particles is limited by the need to pass through the point openings in writing instruments and the need to form stable suspensions that do not settle over time. The *smallest dimension* of the pigment particles is selected to minimize penetration of the particles into the interstices of the substrate material, (e.g., the paper) as these particles are difficult to erase.
- c. a shear thinning additive, because shear-thinning ink exhibits an erasability greater than 90 or even 95 % (par. [0030])

In other words, in the Spencer et al document, the shear-thinning additive is added to the erasable ink composition to:

- (a) increase the viscosity of the ink which is contained and stored in the writing instrument, to prevent it from leaking from the writing instrument; and then
- (b) reduce the viscosity of the ink upon writing, to permit the ink to leave the pen, to reduce the amount of ink (or the ink layer thickness) that is applied to the substrate (paper) to permit application of an ink layer which is sufficiently thin, which shows a sufficiently short drying time and improved erasability.

The present invention does not seek to initially increase the viscosity of the adhesive which is sufficiently high, indeed quite high, with 80% solids content. This is one reason why a person of ordinary skill would not look to the additive in the Spencer et al document and thus it would not be obvious to try – the so-called expected result of increased viscosity is something not desirable.

The present invention does not seek to apply an adhesive layer which is so thin that it is immediately dry. To the contrary, in the present invention solvent (water) evaporation can not be

allowed to dry “immediately” – while relatively quick drying is important, the drying needs to be sufficiently slow to permit achieving adhesion of the corrugated liner to the flat liner. This is a second reason why a person of ordinary skill would not look to the additive in the Spencer et al document and thus it would not be obvious to try – the so-called expected result of immediate drying is something not desirable.

The additive used in the present invention, as noted above, allows for reversible changes in viscosity (i.e., increases and decreases) at various times such as (a) when pumping the adhesive from the reservoir to the application roll, (b) when transferring the adhesive from the application roll to the doctor roll, (c) when transferring the adhesive from the doctor roll to the paper; and (d) when the flat liner is pressed onto the corrugated liner.

Nothing in the Spencer et al document suggests that the viscosity of the additive used therein may be reversibly increased and decreased, by applying and removing shear or pressure. Thus, there would be no reason to “try” or “use” the specific cross-linking agent in the Spencer et al document because there would be no expectation of success vis-à-vis reversal of changes in viscosity.

Finally, when applying adhesive to the corrugations, in the present invention the viscosity increases essentially immediately when the shear force (pressure) is removed and this is important to reduce the risk of the adhesive flowing into the valleys between the corrugations as noted above, because it is preferred that the adhesive remain on the top of the corrugations. There is no teaching in the Spencer et al document that the viscosity of the additive used therein would essentially immediately be restored upon removal of shear or pressure, which permits achieving. Once again, there is no reason or basis (from the Spencer et al document) that this result would be expected and therefore no reason to “try” or “use” the additive of the Spencer et al document.

The present invention relates to an adhesive composition for the manufacturing of corrugated board, which has nothing to do with ink for a writing instrument. The skilled person would therefore never combine the teaching of Duerr with that of Spencer to solve the problem of the present invention.

The present invention relates to an adhesive composition for the manufacturing of corrugated board, which adhesive composition as such has a high viscosity. The problem

that needs to be solved is **not** that the viscosity of the adhesive composition needs to be increased, as is done by Spencer. The problem that needs to be solved is rather that the viscosity of the adhesive composition needs to be reduced upon application to the corrugations and to be restored (increased) as soon as the adhesive is applied so that a sufficiently thick layer of adhesive remains on top of the corrugations.

There is no basis in this record to believe that the person of ordinary skill in the art would look to the “erasable ink” technology for solving problems relating to adhesives and/or the manufacture of corrugated board.

For any, and certainly for all of the foregoing reasons, the invention of independent Claim 19 would not have been obvious to a person of ordinary skill in the art and the rejection of that claim, and all claims depending therefrom, (20-23, 25-31, and 33-41) is respectfully traversed.

Second Rejection – Paragraph 9 of the Office Action

Claims 24 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Duerr (US Patent 5,512,618) in view of Spencer et al. (US 2002/0033116) as applied to claims 19-23, 25-31, and 33-41, and further in view of Charbonneau et al. (US Patent 4,404,246). This rejection is respectfully traversed.

The rejection is traversed to the extent that the Duerr and Spencer et al documents were relied upon for the rejection of claims 19-23, 25-31 and 33-41 for the reasons set forth above in this Response.

Third Rejection – Paragraph 10 of the Office Action

Claim 32 was rejected under 35 U.S.C. 103(a) as being unpatentable over Duerr (US Patent 5,512,618) in view of Spencer et al. (US 2002/0033116) as applied to claims 19-23, 25-31, and 33-41, and further in view of Columbus et al. (US Patent 5,322,880). This rejection is respectfully traversed.

The rejection is traversed to the extent that the Duerr and Spencer et al documents were relied upon for the rejection of claims 19-23, 25-31 and 33-41 for the reasons set forth above in this Response.

CONCLUSION

For the foregoing reasons, Applicants respectfully submit that a *prima facie* case of obviousness has not been established or, in the alternative, any such *prima facie* case has been rebutted by the explanation given above. Accordingly, reconsideration and allowance of all claims is respectfully solicited.

Should the Examiner believe that a telephone conference would expedite the prosecution of this application, the Examiner is requested and encouraged to contact Applicants' attorney at the telephone number given below.

Respectfully submitted,

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